sand screen with eight meshes to the inch is placed inside of the inner steel cylinder. The screen or wire cylinder should fit into position perfectly and there should be no open space between this cylinder and the inner steel cylinder. As the outer cylinder bores into the soil and separates a core of soil from the soil mass, the inner steel cylinder, carrying the wire cylinder is carried downward at a rate uniform with that of the outer cylinder and the core of soil is pushed with but little friction and in an unbroken condition into the wire cylinder. When a sample of soil has been secured to the desired depth, the sampler is withdrawn and the wire cylinder which contains the core of soil is removed from the machine. When the soil sampler is in operation, it is held rigidly in position by a wooden frame which is supported on four legs.

In conclusion it may be said that the advantages which the writer thinks should commend this new apparatus for taking soil samples and particularly those which are used for the determination of the physical characteristics of the soil, are the rapidity with which samples can be secured, and the unchanged physical condition of the core of soil.

The claim is not made for this method that the samples duplicate closely when tests are made regarding the physical properties of a soil type. However, it is the opinion of the writer that the variations are due wholly to factors other than those connected with the operation of securing the samples of soil, and it is not probable that these factors can be eliminated.

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Note on the Crystal Form of Benitoite

Of the thirty-two possible crystal classes deduced mathematically from the empirical law of rational indices by Hessel in 1832, three have no known representative up to the present time. They are the tetragonal bisphenoidal, trigonal bipyramidal and ditrigonal bipyramidal classes. The writer believes that the last-mentioned class, the ditrigonal bipyramidal, has a representative in the new gem mineral, benitoite ($BaTiS_3O_9$) recently described by Louderback.[1]

Several crystals of this interesting mineral obtained through R. M. Wilke were examined and measured, with the following results. The dominant form is a trigonal bipyramid, which determines the habit. If this is taken as the positive unit form, $10\bar{1}1$, the other forms (taking the axes of reference diagonal to the planes of symmetry as in tourmaline) are: $01\bar{1}1$ and $01\bar{1}2$ trigonal bipyramids; 1010 and $01\bar{1}0$, trigonal prisms; and 0001, pinacoid. Of these $01\bar{1}1$ is small, $01\bar{1}2$, a narrow form truncating the polar edges of $10\bar{1}1$ and only found on one or two crystals. Of the two prisms $10\bar{1}0$ is invariably the more prominent, but $01\bar{1}0$ measures a little more in the direction of the $\dot{c}$-axis. The pinacoid 0001 is a small triangular face and on one crystal there were triangular markings parallel to its edges.

Although the general form, *hkīl*, ditrigonal bipyramid, is absent, it is pretty certain that the crystals belong to the class mentioned as there is a horizontal plane of symmetry in addition to three vertical planes of symmetry and three axes of two-fold symmetry as well as a single axis of three-fold symmetry.

Another possibility is that the crystals may belong to the trigonal bipyramidal class in which case the dominant form would be an *hkīl* face, but limit forms are much more common among crystals than general forms. It may also be urged that the crystals may be supplementary twins of the ditrigonal scalenohedral or of the ditrigonal pyramidal class, but as the prism faces show no grooves, nicks, striations or seam through the center, it seems reasonable to regard them as simple crystals.

Sufficient angles were measured to establish the forms as given above. The average of ten values for the angle ($0001 \wedge 10\bar{1}1$) varying from 40° 0′ to 40° 22′, gave 40° 10′ as compared with Louderback's value of 40° 14′.

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[1] *Bull. Dept. Geol. Univ. Cal.*, Vol. 5, pp. 149–153, 1907.